Electron Model Parameters

J. Scott Berg

FFAG Electron Model Phone Meeting

23 February 2005

Constraints

- Multiple of 6 cells (Carol)
- Low energy tunes: 0.39 (H), 0.24 (V), based on muon optimized doublet lattices
- Look at 0.2 T and 0.3 T pole tip fields (Carol)
- $a = 1/12$, 3 mm normalized acceptance

Cell Parameters

Cells	36	42	48	36	42	48
Pole Tip Field (T)	0.2	0.2	0.2	0.3	0.3	0.3
$\Delta E/V_{\text{cell}}$	374	524	692	427	591	774
D Quad Length (mm)	78	68	61	51	45	41
D Quad Radius (mm)	15	14	13	14	13	13
F Quad Length (mm)	66	60	56	44	40	38
F Quad Radius (mm)	26	24	22	24	22	20
Cavity Voltage (kV)	27	19	14	23	17	13
Circumference (m)	14.2	15.9	17.6	12.4	14.1	15.8

Analysis

- $\Delta E/V_{\text{cell}}$ is approximately the number of cell-turns
  - This is, I think, the merit factor for testing muon acceleration
    - Existing muon designs require this to be 500–1500
    - Other problems want small time-of-flight variation also, I think
  - Proportional to n^2/L_{cell}
  - Gain quickly with increasing n
    - L_{cell} reduces with increasing n due to lower dipole
- Increasing pole tip field helps $\Delta E/V_{\text{cell}}$ slightly
  - Cost: aspect ratio of magnets is worse: more end contributions
- I like 42 cells, 0.2 T
  - Get at least 500 cell-turns
  - Higher pole tips not worth the bad aspect ratio